Occupational Risks and Disease



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# Construction

**Construction Injuries**

* Prevalence:
* **US:** One in five worker deaths last year were in construction.
* **KSA:** 35 percent of workplace injuries

The leading causes of private sector worker deaths in the construction industry were falls, followed by struck by object, electrocution, and caught-in/between.

* Disease Pattern:
	+ Construction workers engage in many activities that may expose them to serious hazards, such as falling from rooftops, unguarded machinery, being struck by heavy construction equipment, electrocutions, silica dust, and asbestos.
* Risk Factors / High Risk Groups:
	+ Construction workers **not** following safety protocols.
* Prevention and Control:
	+ **OSHA established several programs to reduce risk of construction injuries:**
		- Fall protection program.
		- Hazard communication standard.
			* The purpose of this section is to ensure that the hazards of all chemicals produced or imported are classified
		- Respiratory protection.
			* In the control of those occupational diseases caused by breathing air contaminated with harmful dusts, fogs, fumes, mists, gases, smokes, sprays, or vapors, the primary objective shall be to prevent atmospheric contamination.
		- Scaffold safety checklists.
* Suggested prevention in Saudi Arabia
	+ work hours reduced to 7 hours
	+ personnel working 6 feet and higher above the ground must be provided with safety belts attached to a secure spot that can withhold the worker's weight in case he falls
	+ workers working at ground level must be provided with hard hats

# Mining

**Silicosis**

* Prevalence:
	+ Accurate assessment of the frequency of silicosis is impossible because of poor record-keeping practices, time delays from exposure to diagnosis, and poor understanding of the relationship between exposure and disease.
	+ An estimated **200,000** miners and **1.7** million others have experienced an occupational exposure to silica.
* Disease Pattern:
	+ Respirable crystalline silica – very small particles at least 100 times smaller than ordinary sand you might find on beaches and playgrounds – is created when cutting, sawing, grinding, drilling, and crushing stone, rock, concrete, brick, block, and mortar.
	+ Initially, workers with silicosis may have no symptoms. As silicosis progresses, there may be difficulty in breathing and other chest symptoms such as cough. Infectious complications may cause fever, weight loss, and night sweats. Severe mycobacterial or fungal infections can complicate silicosis and may be fatal
	+ Silicosis, an incurable lung disease that can lead to restrictive lung disease,lung cancer, and may ultimately lead to death.
* Risk Factors / High Risk Groups:
	+ People who work in the following industries are at greatest risk: asphalt/concrete manufacturing, crushing or drilling rock and concrete demolition,mining.
* Prevention and Control:
	+ Do not use silica sand or other substances containing more than **1%** crystalline silica as abrasive blasting materials. Substitute less hazardous materials.
	+ Practice good personal hygiene to avoid unnecessary exposure to other worksite contaminants such as lead.
	+ Wear disposable or washable protective clothes at the worksite.
* Suggested prevention and control in KSA
	+ Wear protective clothing and follow OSHA protocol

# Farmer

**Farmer’s lung disease**

* Prevalence:
	+ FLD affects approximately **3%-5%** of farmers. In some regions of the world such as Asia, the infection rate is more around 6%.
* Disease Pattern:
	+ It is a hypersensitivity pneumonitis induced by the inhalation of biologic dusts coming from hay dust or mold spores or any other agricultural products. It results in a **type III hypersensitivity** inflammatory response and can progress to become a chronic condition which is considered potentially dangerous.
	+ They usually have :Chills,Fever,Irritating/harassing cough,Runny nose,Sputum streaked with blood,Tightness of the chest,Difficult and laboured breathing,Crackling of breath and Muscular pain.
* Risk Factors / High Risk Groups:
	+ Any farmer **NOT** following safety protocol.
* Prevention and Control:
	+ The only prevention for FLD is ventilating the work areas and using face masks to filter out the antigens attempting to enter the lungs through the air.

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Fire fighters

**Cancer in firefighters:**

* Prevalence:
	+ In **2010**, the National Institute for Occupational Safety and Health (NIOSH) embarked on a multi-year effort to conduct a large-scale study to better understand the potential link between firefighting and cancer. What did they find?
		1. Fire fighters had more cancer deaths and cancer cases than expected.
		2. This increase in cancer was primarily due to digestive, oral, respiratory, and urinary cancers.
	+ Another research suggests that the prevalence of cancer in firefighters is **9-12** percent higher than the general population.
* Disease Pattern (lung cancer):

Chronic exposure to toxic agent with the presence of genetic factors may result in one of the two types of lung cancer: Non-small Cell Lung Cancer (NSCLC) which account for 80% of cases and Small Cell Lung Cancer (SCLC). As their appearance may be similar on chest x-ray or CT scan, the only certain way to distinguish between them is to examine specimens under a microscope. Each has different subclasses within the main categories that are based on the cell type in the lung that is growing abnormally. Symptoms may occur that reflect the impact of the tumor behaving as a mass in the chest and pressing on other structures such as nerves or major blood vessels like (superior vena cava syndrome) and Symptoms may occur from spread of the tumor to outside the chest (metastasis) to other organs causing bone pain and fatigue.

* Risk Factors / High Risk Groups:
	+ Exposure to carcinogens (cancer-causing agents) in the fire fighting environment such as: benzene, formaldehyde, acrolein, perchloroethylene, cadmium and Asbestos.
	+ personal health factors that must be considered. for example having COPD increase the risk for lung cancer.
	+ Sleep deprivation.
	+ Physical exertion.
	+ Diet and smoking
* Prevention and Control:
	+ **The fire service should increase efforts to:**
		1. Educate members about safe work practices. This includes proper training, proper use of protective clothing, and proper use of approved respiratory protection.
		2. Encourage the Firefighters to start the cancer screening programs at age forty, or ten years before the youngest case of cancer diagnosed in the immediate family.

# Spaceflight

**Weightlessness: Bone and Muscle Loss**

* Prevalence:

Bone and muscle loss is the major effect of long term weightlessness, almost all crew members aboard the International Space Station (ISS) lose a percentage of their muscles and bones, but the extent of loss is different.

* Disease Pattern:

The loss of the gravitational load on the musculoskeletal system causes the bones and muscles to deteriorate. On Average, an astronaut loses up to **30%** of their muscle mass within **2 weeks**. On Earth with the gravity load on the bones, the osteoblasts keep replacing the bones over and over, however, if that mechanical stress is lost (outside Earth), the osteoblasts stop functioning and the osteoclasts keep resorbing the bone, which causes Osteopenia, and the **Ca++** coming from the bones can accumulate in other organs most commonly in the kidneys, leading to renal stones.

* Risk Factors / High Risk Groups:

Astronauts who work in microgravity area for long periods have the highest risk for musculoskeletal deterioration, such as the ones who work aboard the ISS for experiments.

* Prevention and Control:

NASA advises all astronauts who go for space flights in addition to limiting the mission period to adhere to a certain lifestyle that will minimize the extent of musculoskeletal deterioration, which includes regular exercise (Treadmill with Vibration Isolation Stabilization (TVIS) and Advanced Resistive Exercise Device (ARED) , **high Ca++** and **protein diet**.

# Airline Pilot

**Melanoma**

* Prevalence:
	+ **Globally:** Pilots are **2.22** times more likely than folks in the general population at large to be diagnosed with melanoma. The estimated incidence of melanoma was found to be significantly increased among airline pilots **faster** than among the general population.
	+ **In KSA:** the incidence of melanoma in saudi general population found to be very low. Unfortunately, there is no study on saudi airline pilots.
* Disease Pattern:

**UV-A** is capable of causing damage to the cells’ DNA. Pilots flying for 56.6 minutes at 30 000 feet receive the same amount of UV-A carcinogenic effective radiation as that from a 20-minute tanning bed session. When planes fly above clouds or snow-covered mountains, they are exposed to even **more** UVA reflected from below. **Airplane windshields** do **not** completely block **UV-A** radiation and therefore are not enough to protect pilots. UV-A transmission inside airplanes can play a role in pilots’ increased risk of melanoma. It typically first appears as a new mole or as changes to an existing mole.

* Risk Factors / High Risk Groups:
	+ Individuals with fair complexions, **red** or **blond** hair, **blue** eyes, **freckles** and skin that sunburns easily.
	+ Family history of melanoma.
	+ The presence of clinically **atypical moles**, and **immunosuppression**.
	+ Pilots flying more than **5,000 hours**, regardless of aircraft type (jet, non-jet).
	+ Flying through more than **five time zones**.
* Prevention and Control:
	+ Wear **Protective Clothing** Like: sun-protective clothing, brimmed hat, and sunglasses.
	+ Wear **Sunscreen** Use broad-spectrum sunscreen (protects against UVA and UVB rays) with SPF of at least 30.
	+ **Limit exposure.**

# Healthcare Workers

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# **Infectious Diseases:**

* Prevalence:

The healthcare and social assistance industry reported more injury and illness cases than any other industry sector -- **653,900** cases That is **152,000** more cases than manufacturing sector which considered to have a lot of hazards.

So we conclude that prevalence of the infectious diseases among HCWs is HIGH.

* Disease Pattern:

Healthcare workers are occupationally exposed to a **variety** of infectious diseases during the performance of their duties because these workers can be found in a variety of workplace settings, including hospitals, nursing care facilities, outpatient clinics … so that is why the diseases vary.

* Transmission/Risk Factors/High Risk Groups:
	+ Routes of infectious disease transmission in healthcare settings and their examples:
		1. **blood-borne transmission:** example: HBV which is the leading cause of death among HCWs).
		2. **Contact transmission**: can be subdivided into direct and indirect contact. Direct contact transmission involves the transfer of infectious agents to a susceptible individual through physical contact with an infected individual by direct skin-to-skin contact. Indirect contact transmission is when the individual makes physical contact with contaminated items and surfaces such is door knobs, patient-care instruments or equipment .. example of contact transmissible infectious agents include Methicillin-resistant *Staphylococcus aureus* (MRSA).
		3. **Droplets containing infectious** **agents** are when an infected person coughs, sneezes, or talks: example of droplet transmissible infectious agents is the influenza virus which causes the seasonal flu.
		4. **Airborne transmission** occurs through very small particles or droplet nuclei that contain infectious agents and can remain suspended in air for extended periods of time ,example is *Mycobacterium tuberculosis* which causes tuberculosis (TB).
	+ **Risks factors:** low immunity states and NOT following protection protocols.
* Prevention and Control:

Provide protection for workers from exposures to the pathogens by using personal protective measures (washing hands, wearing gloves, face masks and lab coats) ,Ventilation ( airborne isolation rooms and well ventilated environment ), blood donation screening, and Immunization.

# Veterinary physician

**Cat scratch disease**

* Prevalence:

In one study 63% of participating veterinary practitioners in practice reported at least 1 bite, 64% reported at least 1 scratch, and 20% reported at least 1 post-bite or scratch infection. 85% reported that the involved animals were cats.

* Disease Pattern:

Infections from a bite or a scratch were most commonly associated with cats. One important disease entity regarding veterinarians is what known as "cat-scratch disease (CSD)" which is a bacterial infection (Bartonella henselae) spread by cats. The cat was recognized as the **natural reservoir** of the disease. However, fleas serve as a **vector** of transmission of B. henselae among cats. **The disease spreads when an infected cat licks a person's open wound, or bites or scratches a person hard enough to break the surface of the skin**. About three to 14 days after the skin is broken, a mild infection can occur at the site of the scratch or bite. The infected area may appear swollen and red with round, raised lesions and can have pus. The infection can feel warm or painful. A person with CSD may also have a fever, headache, poor appetite, and exhaustion. Later, the person's lymph nodes closest to the original scratch or bite can become swollen, tender, or painful.

* Risk Factors / High Risk Groups:
	+ Veterinarians who are handling cats.
	+ Children.
	+ Immunocompromised.
* Prevention and Control:
	+ Training of employees to handle such events (i.e. Cat bites/ scratches)
	+ Keep cat's nails trimmed.
	+ Check for fleas by using a flea comb on cat to inspect for flea dirt.
	+ Wash cat bites and scratches right away with soap and running water.
	+ Apply pressure with a clean towel to the injured area to stop any bleeding.
	+ Apply a sterile bandage to the wound.
	+ Keep the wound elevated above your heart to prevent swelling and infection.

# Petroleum Handlers

Occupational diseases of **lungs**, **skin** and **other organs** are common among workers in petroleum extraction and refining. **These disease are primarily caused by the exposure to:**

**1- Hydrogen Sulfide H2S**

* Disease Pattern:
	+ This gas can irritate lungs, throat, nose, eyes. With high levels of H2S, poisoning can be quick and fatal with little warning
* Risk Factors / High Risk Groups:
	+ A worker not wearing protective equipment
	+ Leaks
* Prevention and Control:
	+ Evacuation plans
	+ Rescue and first aid groups

**2- Drilling Fluids**

* Disease Pattern:
	+ Dizziness, drowsiness, headaches and nausea (commonly associated with hydrocarbon exposure) and dermatitis and sensitization
* Risk Factors / High Risk Groups:
	+ Chemical mixing station/room
	+ Drilling floor
* Prevention and Control:
	+ Careful study of blueprints
	+ Protective helmet and clothes

**3- Mercury**

* Disease Pattern:
	+ Long term exposure to high concentration of mercury vapour does harm to the central nervous system and can induce tremors, stupor, nervousness, personality changes, vision and hearing problems.
* Risk Factors / High Risk Groups:
	+ Welding, grinding, buffing, and polishing
	+ Machining and pipefitting
* Prevention and Control:
	+ Respirators
	+ Gloves

# Scuba Diving**Decompression Illness (DCI):**

* Prevalence:

 Decompression illness affects scuba divers, aviators, astronauts and compressed-air workers. It occurs in approximately **1,000** U.S. scuba divers each year.

* Disease Pattern: DCI encompasses two diseases:

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|  | ***Decompression Sickness (*DCS)** |  ***Arterial Gas Embolism (*AGE)**  |
| **What is it?**  | It is the result of inadequate decompression following exposure to increased pressure. | If a diver surfaces without exhaling, air trapped in the lungs expands with ascent and may rupture lung tissue - **called pulmonary barotrauma -** which releases gas bubbles into the arterial circulation.  |
| **Signs & Symptoms** | Blotchy skin rash, paralysis, muscle weakness, difficulty urinating, confusion, personality changes, bizarre behavior, Amnesia, tremors | -Dizziness, Visual blurring, Areas of decreased sensation, Chest pain,Disorientation |
| **Treatment**  | * **The treatment for DCI is recompression.**
* It is essential that the diver be stabilized at the nearest medical facility before transportation to a chamber.
* Early oxygen first aid is important and may reduce symptoms substantially, but this should not change the treatment plan.
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* Risk Factors / High Risk Groups:
	+ The main risk factor for DCI is a reduction in ambient pressure.
	+ **Others include:** deep / long dives , cold water, hard exercise at depth and rapid ascents.
* Prevention and Control:
	+ **DCS** → Avoiding the risk factors noted above (deep / long dives, exercise at depth or after a dive) will decrease the chance of DCS occurring.
	+ **AGE** → Always relax and breathe normally during ascent.

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